View metadata, citation and similar papers at core.ac.uk
brought to you by CORE
provided by Jurnal Online Universitas Jambi

Jurnal Perspektif Pembiayaan dan Pembangunan Daerah Vol. 9 No.3, July – Augustus 2021 ISSN: 2338-4603 (print); 2355-8520 (online)

Identifying spatial correlation and factors influencing regional economic growth in Southern Sumatra

Nengsi Puspita Dewi*; Tanti Novianti; Dedi Budiman Hakim

Faculty of Economics and Management, IPB University, Indonesia

**To whom correspondence should be addressed. Email: nengsipuspitadewi@apps.ipb.ac.id*

DOI:	Received:	Revised:	Accepted:	Published:
10.22437/ppd.v9i3.13422	21.06.2021	28.07.2021	11.08.2021	31.08.2021

Abstract

This study analyzes the spatial autocorrelation of economic growth and labor and the factors that influence economic growth between districts/cities in the Southern Sumatra region. The data used is secondary data sourced from the Bureau of Central Statistics. The method used is a quantitative approach by applying the Moran Index, LISA, and multiple regression models. This study shows that the spatial autocorrelation of economic growth did not occur in the Southern Sumatra region. Meanwhile, the spatial autocorrelation of labor occurs in this region so that it affects each other. This study's finding that jointly the variables of potential market indicator, fixed capital investment, human capital, and labor force participation rate have a significant effect on GRDP. Likewise, partially the potential market indicators, capital fixed asset investment, human resources, and labor force participation rates have a positive and significant effect on GRDP.

Keywords: *Local Indicator, Morans'I index, Spatial Autocorrelation, Spatial Panel*

JEL Classification: O47, R11, R12

INTRODUCTION

Natural resources in each region have different potential. From these differences, natural resources need management and domestic resources that can encourage infrastructure development and investment of human capital, business capital, technology, and information to develop existing domestic resources (resource endowment) to become productive on an economic scale (Adifa, 2007). Resource endowment theory states that regional economic development depends on the natural resources owned and the demand for commodities produced from these resources. In the short term, the regional resources are an asset to produce the goods and services needed (Perloff & Wingo, 1961).

As an illustration, the provinces of South Sumatra, Bengkulu, Bangka Belitung Islands, and Lampung geographically have the advantages of different production factors, economic potential, and resources. The differences in each region trigger linkages with economic activities that are useful for maintaining sustainable economic growth. The Southern Sumatra region has the lowest total GRDP with a 2015-2019 range of 2,983,978.7 billion. Meanwhile, Central Sumatra has the highest total GRDP of 4,662,148.6 billion. The difference in the amount of GRDP on the Island of Sumatra

proves that the spatial aspect is one of the considerations resulting from regions that influence economic growth. The farther away the region is, the smaller the spatial autocorrelation effect.

Southern Sumatra region is currently developing into four provinces, consist of South Sumatra, Bengkulu, Bangka Belitung Islands, and Lampung. The population as a whole has increased from 2015-2019. The province with the highest average population in 2015-2019 in the Southern Sumatra region is Lampung Province, amounting to 8,286,037 people. The lowest average population in 2015-2019 is the Bangka Belitung Islands Province, amounting to 1,430,835 people. The increase in this population triggers interaction of the population to full of their necessities, such as economic, governmental, and social activities. The form of economic activity carried out by the community in an area, such as looking for work or working in another area, can lead to various livelihoods.

According to Boukebbab & Boulahlib (2015), spatial interaction between regions is the movement of people, goods, or information between origin and destination regions through geographical space in the form of flows between locations. The existence of interrelated interactions between regions shows the economic growth that cannot claim to believe in the region itself. Therefore, the economic growth of a region will be largely built by the development of the surrounding area, especially with the entry of production factors from the surrounding area (Heryanti, Junaidi, & Yulmardi, 2014). In the research of Soares, Rustiadi, & Mulatsih (2017), the flow of production factors that enter from other regions shows dependence between regions.

The system of inter-regional linkages are based on an analysis of regional economic development, in which the form of interregional linkage in the economic field is in the form of: the flow or flow of goods and the market chain for semi-finished goods and final goods, production linkages, consumer patterns (shopping), economic control and ownership patterns, income streams including transfers and remittances, capital flows, formal and informal financial systems, medical labor (labor migration) and education (Bendavid-Val, 1991). The existence of economic events in the form of demand and supply can determine the economic growth of each region (Bräuninger & Niebuhr, 2011).

In addition, Mariana (2013) states that the availability of facilities allows a person to move from one area to another, especially areas that have closeness between counties/cities with one another, allowing the movement of residents to work or find work in an area. Population movement is defined as the migration activity that forms human capital (Scardaccione, et al. 2010). Indications of spatial effects between regions are shown based on differences in total GRDP, influenced by geographical conditions, economic structure, and employment similarities, and population migration from one area to another. Based on this phenomenon, this study focuses on analyzing the spatial interaction of the economy and labor and identifying the factors that influence economic growth between counties/cities in the Southern Sumatra region.

METHODS

This study uses the relevant data on Southern Sumatra's 4 provinces with 49 counties/cities over 5 years. The type of data used in this study is secondary data (Time Series). The secondary data used in this study were sourced from various relevant agencies such as the Central Bureau of Statistics Publications, which were accessed through the official website and government agencies that could support this research

data. The data used is in panels from 2015 to 2019 consisting of 49 counties/cities of Southern Sumatra Province. The dependent variables in this study include regional income data or Gross Regional Domestic Product (GRDP) of districts/cities in the Southern Sumatra region, detailed according to business fields. To eliminate the effect on prices, the GRDP variable used is constant price GRDP. At the same time, the independent variables include human capital, fixed asset investments, labor, and potential market indicators. Table 1. presents 5 variables, definitions, and indicators used in the study.

Table 1. Definitions of variables

Variable	Definition	Indicator
GRDP	The total value of goods and services (output) or added value produced by an area (county/city) in a certain period, usually one year.	GRDP by business field in each county/city in the Southern Sumatra region based on 2010 constant prices.
Human Capital	Human capital can include aspects of education, training, and health that produce expertise and skills, which will affect the productivity of work.	The percentage of people with a junior college degree or above in the region is fifteen and above.
Fixed Assets Investment	Expenditures for capital goods that have a service life of more than one year and are not consumer goods. PMTB includes residential and non-residential buildings, other buildings such as roads and airports, and machinery and equipment.	Fixed assets investment data is part of the expenditure GRDP in each area of Southern Sumatra.
Labor	Labor input to produce output	The percentage of the workforce to the working-age population collected from the bureau statistics publications counties/cities.
Market Potential Indicator	The spillover effect between regions in economic development.	The market potential indicator will be calculated by dividing GDP by the euclidean distance.

The analytical tools used are the Moran index, Moran scatterplot, location indicator spatial association (LISA), and OLS regression models. This method is appropriate to determine the spatial effect of economic growth and labor and the factors that influence economic growth in the region.

According to Lee & Wong (2001), the Moran Index tests spatial dependencies or autocorrelation between observations or locations. At this stage, economic growth and labor characteristics are analyzed using Moran's I to prove spatial dependencies or spatial influences between counties/cities. Moran's Global Index is formulated as follows:

$$I = \frac{N\sum_{i=1}^{n}\sum_{j=i}^{n} w_{ij}(x_i-\bar{x})(x_j-\bar{x})}{(\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij})\sum_{i}^{n}(x_i-\bar{x})^2} \quad \ldots\ldots (1)$$

Where I means Moran Index, X_i and X_j are the GDRP of Region i and j, N is the number of regions, and W is a spatial weight matrix. This paper gives the element value in W as the inverse distance weight (IDW). The use of the inverse distance weight in this study was chosen by considering the assumption that as the geographical distance increases, it will affect the spatial interaction between regions, which means that the spatial interaction between regions will decrease due to the geographical distance of the regions

getting further away.

Furthermore, The LISA test was carried out to find a spatial autocorrelation relationship in each observation area which the Moran index could not explain. LISA is formulated as follows:

$$I_i = Z_i \sum_{i=1}^{n} W_{ij} Z_j \quad \ldots\ldots (2)$$

Where Z_i and Z_j are $Z_i = \frac{(x_i - \bar{x})}{\sigma_x}$, $Z_j = \frac{(x_j - \bar{x})}{\sigma_x}$ Zi and Zj are standardized data. W_{ij} is the weighting between locations i and j. σ_x is the standard deviation of the variable x. X_i is the number of observations of GRDP/labor in county/city i. X_j is the number of observations of GRDP/labor in the county/city j. At the same time, $\bar{X}$ is the average number of observations of GRDP/Labor.

The results of the Moran index will be described based on the Moran Scatterplot, which consists of four quadrants. Each quadrant is limited by the average of the Y and WY lines. A quadrant is a division of regional groups that can determine the relationship between regions, both positive and negative. At the same time, the region has high characteristics if the value is above the average. On the other hand, areas with low characteristics have values below the average. The four quadrants referred to are as follows (Zhukov, 2010):

1. Quadrant I: Consists of areas with high characteristics surrounded by areas with high characteristics (HH, High-High clustering). Quadrant I is the Hot-Spot because it consists of areas with high characteristics or areas that have positive spatial relationships.
2. Quadrant II: Consists of areas with low characteristics surrounded by regions with high characteristics (LH, Low-High clustering). Quadrant II is a spatial outlier because it consists of regions with different characteristics. If the region tends to cluster in spatial outliers, the spatial relationship is negative.
3. Quadrant III: Consists of an area with low characteristics surrounded by an area with low characteristics (LL, Low-Low clustering). Quadrant III is the Cold-Spot because it consists of areas with low characteristics. If the region tends to cluster in the Cold-Spot area, the spatial relationship is positive.
4. Quadrant IV: Consists of areas with high characteristics surrounded by regions with low characteristics (HL, High-Low clustering). Quadrant IV is referred to as spatial outliers, the same as quadrant II because this area consists of different characteristics. If the region tends to cluster in spatial outliers, the spatial relationship is negative. In contrast, spatial interaction is non-existent if the area is randomly distributed in all quadrants.

This study has adopted the frequently used Harris' market potential function. According to Wenqing (2013), market potential indicators show a Spillover Effect that arises due to the regions' growth poles or growth centers affected by the agglomeration effect. The function is formulated as follows:

$$MP_{it} = \sum_{j \neq i} \frac{PDRB_{jt}}{d_{ij}} \quad \ldots\ldots (3)$$

$PDRB_{jt}$ is the GDRP of region j in year t, and dij is the Euclidean distance between the capital cities of region i and region j.

The regression equation model that will be used in this study is determined by the results of the Moran I test. If the results of Moran I show a spatial autocorrelation,

the model to be used is panel regression with spatial modeling. The spatial panel data model is a form of development or modification that considers the surrounding area or the data to be used influences neighbors (Equation 4).

$$lnY_{it} = \alpha + u_i + \sum_{i=1}^{N} w_{ij} lnY_{jt} + \beta_1 lnK_{it} + \beta_2 lnMP_{it} + \beta_3 KL_{it} + \beta_4 L_{it} + \rho \sum_{i=1}^{N} w_{ij} \phi_{jt} + v_{it} \quad (4)$$

Meanwhile, if the results of the Moran Index show no spatial autocorrelation, the model used is static panel regression. The use of this model is considered appropriate because the marginal effect of the explanatory variable is seen from two dimensions, namely individual and time, so that the estimated parameters will be more accurate than other models. In addition, technically, panel data can provide informative data, reduce collinearity between variables, and increase degrees of freedom, increasing efficiency. The static panel regression model specifications are as follows:

$$lnY_{it} = \alpha_0 + \beta_1 lnK_{it} + \beta_2 lnMP_{it} + \beta_3 KL_{it} + \beta_4 L_{it} + v_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

where the subscript i stands for the region, t for the year, and Yit for the GDRP of Region i in the Year t; K_{it} is capita fixed assets investment. MP_{it} is a market potential indicator that shows in equation (3). KL_{it} represents a change in human capital, where KL_{it} is the percentage of people with a junior college degree or above in the population aged fifteen and above in region i and year t, and L_{it} is the labor force participation rate in region r and year t.

RESULTS AND DISCUSSION

Spatial analysis techniques applied to economic, labor spatial correlation in Southern Sumatra

The Moran Index statistic corresponding to Moran scatterplots and Local Indicator of Spatial Association (LISA) has been calculated in this study. Moran Index provides an overall measure of Spatial Autocorrelation. Moran scatterplots show a graphic representation of spatial correlation and enable an investigation of possible local spatial correlation. LISA accounts for the local effects of the phenomenon.

Moran's Index Test with Moran Scatterplots

The spatial correlation of GDRP and Labor in the Southern Sumatra region will be measured by calculating Moran Index. Table 2 shows the calculation results and test values of Moran's I Index with inverse distance weight matrix for 2015-2019.

Table 2. Global Moran Index of GRDP and number of labor 2015-2019

Data	Year	Moran Index	Prob.
GDRP	2015	0.01461	0.3542
	2016	0.01467	0.3524
	2017	0.01447	0.3533
	2018	0.01397	0.3579
	2019	0.01384	0.3596
Labor	2015	0.06635*	0.00034
	2016	0.07149*	0.00015
	2017	0.07384*	0.00010
	2018	0.07689*	0.00006
	2019	0.07807*	0.00005

*Note: the level of significance at *1%*

The results indicate that spatial correlations do not exist for economic growth in Southern Sumatra. Table 2 shows the value of the Moran index has decreased every year. Unfortunately, this value does not significantly affect the spatial correlation with a 5% or 10% significance level. Counties/cities in the Southern Sumatra region have a considerable distance from each of the provincial capitals of the Southern Sumatra province. As is well known, the provincial capital is the center of the growth of a province which is assumed to have facilities in various aspects such as economy, government, education, health, which are far more complete than other administrative areas. Thus, it is difficult for residents in an area to move from one area to another. It supports the assumption that the farther the geographical distance, the smaller the degree of spatial interaction. In addition, infrastructure in the form of roads and modes of transportation are other factors that result in the strength of interaction between regions being very small and insignificant.

Meanwhile, based on the results in Table 2, the amount of labor in Southern Sumatra has a spatial correlation with each other. Based on the probability test, which is smaller than the level significant at 1%. Table 2 shows a positive moran index value from 2015-2019, which means Southern Sumatra has a positive spatial autocorrelation. When viewed as a whole, the Moran index value from 2015-2019 has increased every year. This increase in value shows the strength of interaction between regions is getting stronger than in previous years. The higher the Moran index value, the stronger the impact of spatial correlation between areas. The Moran value of the labor in 2019 is the highest Moran index value compared to the previous four years. It means the strongest spatial interaction occurred in the Southern Sumatra region in 2019.

The grouping of regional economic growth detected by spatial autocorrelation is not suitable for spatial interpretation because the results of the Moran index are not significant, which means that there is no link between economic growth in the Southern Sumatra region. However, The spatial correlation pattern of the Southern Sumatra labor is shown in Figure 1, which is plotted into a quadrant of the Morran Scatterplots. Based on Morran Scatterplots, the spatial correlation grouping pattern is relatively the same from 2015-2019. Therefore, these areas are divided into four quadrants as follows:

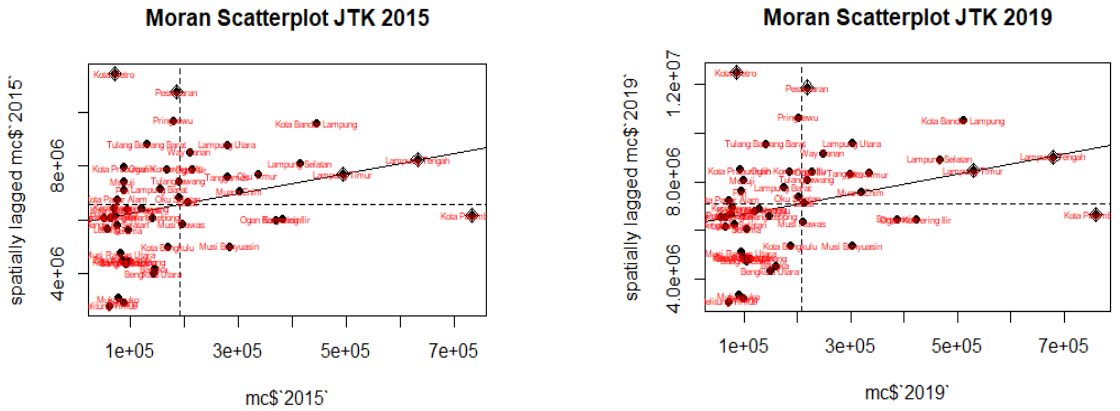

Figure 1. Moran Scatterplot of the amount of labor in the Southern Sumatra

Quadrant I (High-High) are included in the high labor surrounded by counties/cities with the same high consists of thirteen counties/cities spread over two provinces, namely Lampung province which consists of Central Lampung Regency, East Lampung, South Lampung, North Lampung, Tanggamus, Way Kanan, Pesawaran,

Tulang Bawang, and Bandar Lampung City. Meanwhile, the other 4 regencies/cities are Muara Enim, Ogan Ilir, Lahat, and East OKU districts which are located in the province of South Sumatra. ***Quadrant II (Low-High)*** consist of five counties/cities all located in Sout Sumatera Province, namely Musi Banyuasin, Banyuasin, Ogan Komering Ilir, Musi Rawas, and Palembang City.

While, ***Quadrant III (Low-Low)*** is the main cluster from all of the quadrants consisting of twenty-one counties/cities spread over three provinces, namely South Sumatra, Bengkulu, and Bangka Belitung Islands. Bengkulu province is the most dominantly areas, which is as many as eleven regencies/cities consisting of Kepahiang Regency, Central Bengkulu, Rejang Lebong, Kaur, West Coast, South Bengkulu, Seluma, Lebong, Muko Muko, North Bengkulu, and South Bengkulu. Bengkulu City. The other ten regencies/cities included in this quadrant grouping are located in the provinces of South Sumatra and the Bangka Belitung Islands which consist of Empat Lawang Regency, North Musi Rawas, Lubuk Linggau City, East Belitung Regency, Belitung, Bangka, South Bangka, Central Bangka, Bangka West and the city of Pangkal Pinang.

The fourth Quadrant (High-Low) consists of five counties/cities in Lampung provinces: Pringsewu, Tulang Bawang Barat, Mesuji, West Lampung counties, and Metro city are located in the province of Lampung. Meanwhile, Pali, Ogan Komering Ulu, South OKU counties, Pagaralam, and Prabumulih cities are located in South Sumatra province.

Local Indicator of Spatial Autocorrelation (LISA)

Regional economic growth in 2015 with a significant LISA of 10% value was included in the High-High cluster, namely Banyuasin, East Lampung, and South Lampung counties. Whereas in 2019, only two districts had local spatial autocorrelation values, namely Banyuasin and East Lampung, shown in figure 1. Based on the analysis results, most economic growth in the Southern Sumatra region is independent, not affected by changes between counties. On the other hand, Figure 2 shows the spatial labor's LISA Cluster Map in 2015 and 2019. There is a significant labor spatial autocorrelation in several districts/cities in two clusters: High-High and Low-High Clusters.

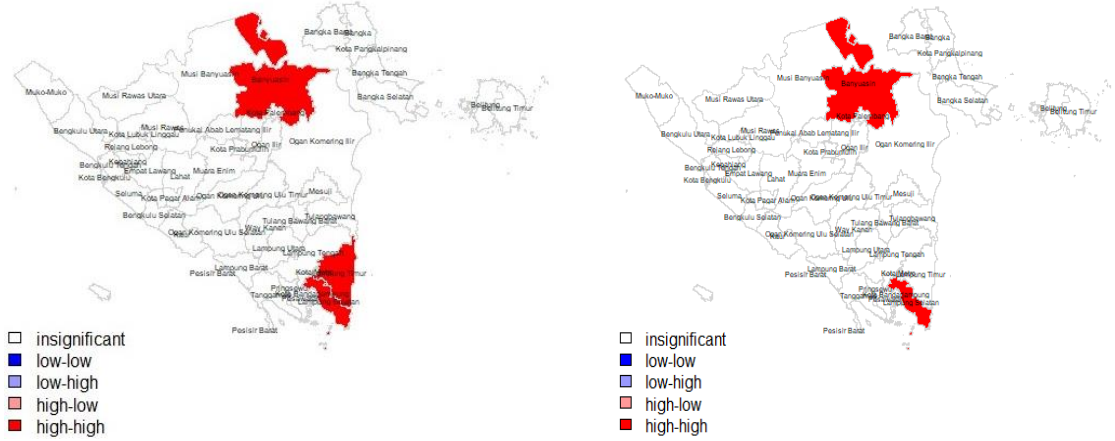

Figure 1. LISA cluster maps economic growth spatial 2015 and 2019

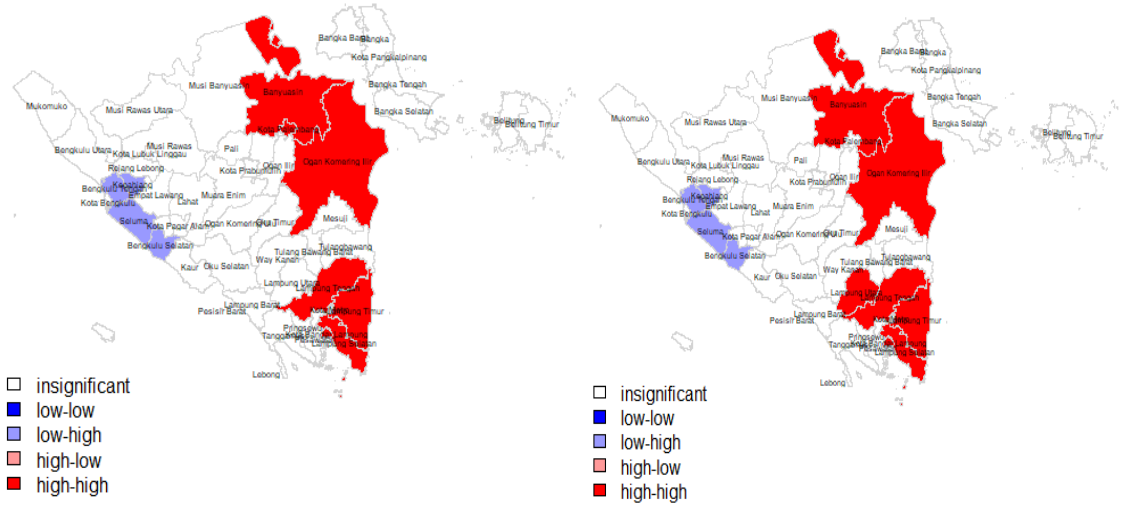

Figure 2. LISA cluster maps labor spatial 2015 and 2019

In Figure 2, LISA Cluster Maps for Labor 2015 and 2019 show the region grouping occurs in High-High and Low-Low clusters. The region included in the high-high cluster grouping is counties/cities located in South Sumatera and Lampung provinces with a level significance of ten percent. These regions, Palembang and Bandar Lampung Cities are the capital province of South Sumatera and Lampung. The capital province is the center of economic activity; therefore, the surrounding regions, namely Banyuasin Regency, Ogan Komering Ilir, Central Lampung, East Lampung, South Lampung, are affected by the economic activities that occur in the center of economic activity. Most of the counties/cities in Bengkulu Province are in the Low – High cluster, which means that the region has a low number of laborers and groups with other counties/cities that have a high number of laborers. The existence of a local spatial autocorrelation that is negative to the number of laborers in the Bengkulu province, namely Seluma, Bengkulu Tengah, South Bengkulu, and Kepahiang counties, is caused by the uneven distribution of added value in each region.

Residents in the city are labor in the agriculture sector and government employees who only rely on wages or salaries. Meanwhile, the greater added value comes from taxes and surplus from a business in the nearest city, Bengkulu city. This finding is supported by Bawono's (2011) research, which states that the added value of urban areas will be greater than that of rural areas. Furthermore, the spatial local correlation pattern that is not significant means no grouping of workers. The Province of the Bangka Belitung Islands and some areas in the other three provinces are districts/cities with many workers. Still, they do not have cluster significance with neighboring counties/cities. This is also determined by the geographical location where the province of the Bangka Belitung Islands is divided into archipelagos. Thus, the distribution of labor in the counties/cities of the BABEL province is not significant enough to act as growth centers for the surrounding regions.

Factors influencing economic growth in Southern Sumatra Region

Based on the 2015-2019 Moran I GRDP test results shown in table 2, the 2015-2019 Moran GRDP value is not significant. The probability value is greater than the significance level of 5% or 10%, so there is no spatial autocorrelation in the model. It is due to the geographical distance between regions that are not close together, inefficient infrastructure, and public transportation resulting in a low level of population density.

Therefore, the economic growth of the Southern Sumatra region is independent or does not affect each other. Thus, the appropriate model to explain the factors that influence the economic growth of the Southern Sumatra region is the static regression panel model because the spatial panel model sees the influence of space. In contrast, the economic growth of the Southern Sumatra region does not have the effect of neighbors.

As shown in Table 3, Sum r-squared resid value from the weighted statistic of 2.354680 is smaller than the unweighted statistic of 4.072382. It means that the heteroscedasticity problem can be solved. Durbin Watson test is used to test the presence or absence of autocorrelation. In the model, before being weighted, it has a value of 0<dw<dL(1.73), so it can be concluded that there is a positive autocorrelation problem. Therefore, to overcome autocorrelation in the model, estimation is carried out using Generalized Least Square weighting. Thus, the problems of heteroscedasticity and autocorrelation can be overcome (Juanda 2009). The multicollinearity test shows that the partial correlation value between all independent variables analyzed is smaller than 0.8 (Rho Spearmen Correlation), which means that free of multicollinearity.

Tabel 3. The result of model estimation

Dependent Variable LNPDRB			
Variabel		Koefisien	Prob.
C	Constant	1.949208	0.0000
LNKIT	Capita Fixed Assets Investment	0.805061*	0.0000
LNMPIT	Market Potential Indicator	0.034062*	0.0001
KLIT	Human Capital (The Percentage Of People With A Junior College Degree Or Above In The Population Aged Fifteen And Above)	0.002304*	0.0020
LRIT	The Labor Force Participation Rate	0.001758*	0.0020
R-Squared = 0.979931; $F_{Statistic}$ = 13490.33; Prob(F-Statistic) = 0.000000			
sum r-square resid weighted = 2.354680; dan sum r-square resid unweighted = 4.072382; $DW_{statistic}$ weighted = 1.204774; $DW_{statsitic}$ unweighted = 1.581646;			

*Note: the level of significance at *1%*

The results of panel regression with Fixed Effect Model (FEM) show that all independent variables have a significant positive effect on the economic growth of counties/cities in the Southern Sumatra region with a significance level of one percent. Capita Fixed Assets Investment has a significant positive effect on GRDP with a coefficient value of 0.80501. The coefficient value of 0.80501 indicates that when there is an increase in investment in fixed assets by 1%, it can increase economic growth by 0.80501%, ceteris paribus assumption. This is similar to Wenqing's (2013) research, which states that fixed capital formation positively affects regional economic growth. In addition, the results of research estimates on this variable are in accordance with Solow's growth theory which states that capital accumulation is one of two inputs that play an important role in output growth. Harrod-Domar's growth theory states that investment or capital formation has a direct effect on economic growth.

Then, the next independent variable is the labor force, which has a positive and significant effect on economic growth. An increase in the labor force by 1% can increase economic growth by 0.00176%. The positive relationship between labor variables and economic growth is similar to Nizar, et al. (2013), which is that the labor force has a positive effect on regional economic growth. This result is also in accordance with Solow's growth theory, which states that labor is one of the two inputs that play an important role in output growth. The more the workforce working in an

area, the higher the ability to produce output. This will encourage the level of aggregate supply so that it will encourage economic growth.

The estimation results of market potential indicator variables show a positive and significant effect on economic growth at a one percent level of significance with a coefficient of 0.0341. This coefficient value means that an increase of 1% of market potential indicators can increase economic growth by 0.0341%. According to Wenqing (2013), market potential indicators indicate a spillover effect that arises as a result of externalities resulting from agglomeration in a region. This is in line with the new economic geography (New Economic Geographic Theory), which focuses on the importance of the location of economic activities. The results of this study are also similar to Dewi & Masbar (2016), which state that economic growth will increase due to agglomeration, which triggers economic activity in increasing land use so that the price of a plot of land becomes high.

The human capital variable, which is represented by the percentage of the population aged 15 years and over according to the diploma level or more that has been completed, produces a coefficient value of 0.0023 with a probability smaller than the five percent of level significant, which means that the variable is positive and significant to economic growth. The coefficient value means that if there is an increase of 1% in the number of workers who have diploma education and above, it will increase economic growth by 0.0023%. This is similar to the research of Odit, et al. (2018), which states that human capital plays an important role in economic growth, especially as an engine for increasing the level of output, besides that human capital also shows an increase in productivity which with the presence of good human resources. Educated can facilitate the application of new technology in an area. Not only that, the new economic growth theory considers aspects of human capital and technology. Therefore, these research results align with the new economic growth theory (New Growth Theory), which states that the accumulation of human capital can provide greater and more innovation or Research and Development (R&D). This can lead to endogenous growth.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

There was no spatial dependence on the economic growth of counties/cities in Southern Sumatra. However, inter-regional linkages occur in the development of the labor force in the region. It means that the counties/cities in the region interact with each other in meeting the needs of workers in each region.

The grouping of relationship patterns is formed due to spatial interactions in the employment of counties/cities in the Southern Sumatra region. The cluster of the spatial interaction county/city labor force in the region is in the four quadrants, namely the quadrant with clusters of High-High, Low-High, Low-Low, High-Low.

Almost all economic growth counties/cities in the Southern Sumatra region do not have local spatial autocorrelation. Furthermore, statistical panel data regression analysis show that Gross Fixed Capital Formation, market potential, percentage of population indicators aged 15 years and over according to diploma education and above and, the percentage of the workforce has a significant positive effect at a significant level of 0.05% on Domestic Product Regional Gross Domestic Product.

Recommendations

Alternative recommendations based on the results of this study include that the government of each county/city in the Southern Sumatra region needs to continue to improve and maintain its economic growth. This can be done in various ways, such as paying attention to the leading sectors in each region so that inter-regional linkages can be useful in supporting a sustainable growth economy. Differences in leading sectors trigger the need for human resources in each region differently. Therefore, the government needs to focus on leading sectors that are useful in determining regional development policies.

In addition, the government of each region can make efforts to develop investment development strategies such as in the field of infrastructure facilities in the form of road access between districts/cities, public facilities, and public transportation to support the level of population mobility so that relations between counties become more effective and efficient. For labor and human capital in each county, the government can improve labor quality through education followed by technological developments in each region. The inter-regional linkages need to be considered and coordinated in regional development planning. This is done in order to generate synergies and progress together with the surrounding area.

REFERENCES

Adifa, Y. (2007). *Analisis Kesenjangan Pembangunan Antar Wilayah Pembangunan Di Kabupaten Alor Provinsi Nusa Tenggara Timur*. [Master Theses]. Institut Pertanian Bogor.

Bawono, N. (2011). *Keterkaitan Spasial Perbedaan Produktivitas Tenaga Kerja Kabupaten/Kota Di Pulau Jawa*. [Master Theses]. Institut Pertanian Bogor.

Bendavid-Val, A. (1991). *Regional and Local Economic Analysis for Practitioners*. New York: Greenwood Publishing Group, Inc.

Boukebbab, S., & Boulahlib, M. S. B. (2015). The Spatial Interactions Using the Gravity Model: Application at the Evaluation of Transport Efficiency at Constantine City, Algeria. *Advances in Intelligent Systems and Computing*, *365*, 305–318. https://doi.org/10.1007/978-3-319-19216-1

Bräuninger, M., & Niebuhr, A. (2011). Agglomeration, Spatial Interaction and Convergence in the EU. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.756725

Dewi, A. E. P., & Masbar, R. (2016). Aglomerasi dan Pemanfaatan Ruang di Kota Banda Aceh. *Jurnal Ilmiah Mahasiswa (JIM)*, *1*(2), 311–320.

Heryanti, Y., Junaidi, & Yulmardi. (2014). Interaksi Spasial Perekonomian dan Ketenagakerjaan Antar Kabupaten/Kota di Provinsi Jambi. *Jurnal Perspektif Pembiayaan Dan Pembangunan Daerah*, 2(2), 99-106

Lee, J., & Wong, D. W. S. (2001). *Statistical Analysis with Arcview GIS*. New York: John Wiley and Sons.

Mariana. (2013). Pendekatan Regresi Spasial Dalam Pemodelan Tingkat Pengangguran Terbuka. *Jurnal Matematika Dan Pembelajaranya*, *1*(1), 42–63.

Nizar, C., Hamzah, A., & Syahnur, S. (2013). Pengaruh Investasi dan Tenaga Kerja Terhadap Pertumbuhan Ekonomi Serta Hubungannya Terhadap Tingkat Kemiskinan di Indonesia. *Jurnal Ilmu Ekonom*i, *1*(2), 1-8.

Odit, M. P., Dookhan, K., & Fauzel, S. (2018). The impact of education on economic growth: The case of India. *International Business & Economics Research Journal*,

66(1), 253–262. https://doi.org/10.11118/actaun201866010253

Perloff, H., & Wingo, L. J. (1961). Economic Growth Natural Resources and Economic Growth. In Joseph (Ed.), *Natural Resources Endowment and Regional*. Washington D.C: Resouces for the Future.

Scardaccione, G., Scorza, F., Casas, G. Las, & Murgante, B. (2010). Spatial autocorrelation analysis for the evaluation of migration flows: The Italian case. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, *6016 LNCS*(PART 1), 62–76. https://doi.org/10.1007/978-3-642-12156-2-5

Soares, L., Rustiadi, E., & Mulatsih, S. (2017). Analisis Disparitas dan Interaksi Spasial di Tomor-Leste. *Journal of Regional and Rural Development Planning*, *1*(1), 74–86.

Wenqing, P. (2013). Regional Correlation and Spatial Spillovers in China's Regional Economic Growth. *Social Sciences in China*, *34*(3), 125–139. https://doi.org/10.1080/02529203.2013.820566

Zhukov, Y. M. (2010). Applied Spatial Statistics in R , Section 4 Spatial Point Processes Spatial Data and Basic Visualization in R. *Statistics*, 1–18.

© 2021 by the authors. Licensee JPPD, Indonesia. This article is an open-access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (http://creativecommons.org/licenses/by/4.0/).